A Review of the Department of Defense December 31, 1981 Selected Acquisition Report (SAR)

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A REVIEW OF THE DEPARTMENT OF DEFENSE DECEMBER 31, 1981, SELECTED ACQUISITION REPORT (SAR)

Congress of the United States
Congressional Budget Office

NOTE

Unless otherwise noted, all dollar amounts are in current (or then-year) dollars.

PREFACE

This study presents the results of a Congressional Budget Office (CBO) review of the Department of Defense's Selected Acquisition Report (SAR) dated December 31, 1981. It provides in a few pages facts and data culled from about 900 pages of SAR information. The study is designed to be used by Congressional staff members working in the area of defense weapons system acquisition. It looks at total cost changes in all SAR programs for the period from September 30 to December 31, 1981; presents data to demonstrate the effect of cost growth on the unit costs of individual systems; measures the progress of Defense Department management initiatives; and evaluates the completeness and accuracy of the most recent SAR.

This study was requested by the House and Senate Committees on Appropriations and Armed Services. In accordance with CBO's mandate to provide objective and impartial analysis, the paper makes no recommendations. William Myers, Patrick Haar, and Edward Swoboda of CBO's Budget Analysis Division prepared the paper under the general supervision of James Blum and C.G. Nuckols. Robert L. Faherty and Francis Pierce edited the manuscript. Suzie Fominaya typed the several drafts.

Alice M. Rivlin
Director

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SUMMARY

The Selected Acquisition Report (SAR) is a quarterly status report from the Department of Defense (DoD) to the Congress on major defense acquisition programs. It is one of the most comprehensive and consistent sources of data on defense weapons systems costs. The report is submitted in two stages—an advance or preliminary copy, and a final version provided within 15 days after the advance submission. The SAR presents each system program manager's current "best estimate" of key performance, schedule, and cost goals for the total program. For fiscal year 1983, the 47 systems included in the SAR account for 48 percent of the Administration's overall defense procurement request of $88.7 billion.

Data in the most recent SAR, that of December 1981, correspond to the President's budget proposal for fiscal year 1983, released on February 8, 1982. Working from that budget, the December SAR extends the cost estimates for each program to the end of the program as it is planned at the present time. This extension of costs makes possible the first real look at the Administration's planned defense buildup. It also provides the first chance to evaluate the financial impact on SAR programs of DoD's well-publicized management initiatives.

This study of the December 1981 SAR has three major purposes:

- To examine the magnitude and causes of cost changes for the SAR systems as a whole;
- To present data that for individual systems demonstrate the effect of recent cost growth on unit costs, measure the progress of DoD management initiatives, and indicate potential future cost growth.
- To evaluate the accuracy and completeness of the cost data presented in the SAR.

TOTAL COST CHANGES IN ALL SAR PROGRAMS (Fourth Quarter 1981)

The December 1981 SAR contains the largest quarterly increase in total SAR costs ever reported--$150.1 billion in current dollars, a 50 percent increase over the preceding quarter. In Summary Table 1, that increase is broken into three broad categories: net quantity changes; program additions and deletions to the SAR; and net cost growth.

SUMMARY TABLE 1. ANALYSIS OF COST CHANGES IN ALL SAR PROGRAMS FROM SEPTEMBER TO DECEMBER 1981 (In billions of dollars)

Total Costs of SAR Programs September 1981 (48 Systems)		304.7
Cost Changes September-December 1981		150.1
Net Quantity Changes	99.2	
Programs Eliminated from SAR (2 systems)	-1.3	
Program Added to SAR (1 system)	29.5	
Net Cost Growth	22.7	
Total Costs of SAR Programs December 1981 (47 systems)		454.8

SOURCE: Compiled by CBO from data provided by DoD. The DoD cost data are restated to reflect as quantity change all increases resulting from the decision to acquire additional units.

Additional planned procurement quantities associated with the expansion of defense programs accounted for $99.2 billion, or 66 percent of the total increase. Two-thirds of this increase reflects the cost of additional tactical aircraft. Other large increases are in planned ship and missile procurement.

Two small systems totaling $1.3 billion were dropped from the SAR. One program was added--the B-1B bomber, with a projected acquisition cost of $29.5 billion. The net increase in the SAR total cost from these changes was $28.2 billion, or 19 percent of the overall increase.

The overall result of these additional procurement quantities and the deletion or addition of programs included in the SAR was to add $127.4 billion to the September SAR cost, or 85 percent of the total increase reported between September and December.

Net cost growth caused by factors other than quantity changes or additions and deletions to the SAR totaled $22.7 billion, or 15 percent of the

total increase reported in December. This growth results from engineering, estimating, schedule, economic, support, or other changes in the programs as they were planned in the September SAR. The following section deals with this category of cost changes.

CONTINUED COST GROWTH IN INDIVIDUAL SYSTEMS

Cost growth between September and December has raised unit costs by a substantial margin for many SAR programs. A wide variety of causes are responsible for the continued cost growth in existing systems. DoD has taken several steps to control costs over the past year, but it is difficult to track the savings that DoD has claimed for SAR programs as a result of these management initiatives. In addition, the December SAR contains indications of future cost growth.

Unit Costs and the Nunn Amendment

The Nunn Amendment requires that the Congress be notified when either SAR total program unit costs or 1982 procurement unit costs are more than 15 percent higher than the unit costs reported in the March 1981 SAR. Failure of the service secretary to notify the Congress within 30 days after determination that a system has exceeded the 15 percent threshold results in a suspension of the authority to obligate funds for that system. The purpose of this amendment is to enable the Congress to become aware of cost growth in time to take appropriate action. In December, 23 systems exceeded the 15 percent threshold, some by as much as 50 percent. Two of the systems were, for various reasons, not reported. Five systems were within three percentage points of the threshold.

Quantity changes appear to have played an important role in at least 10 of the 20 systems reported to have exceeded the threshold. When programs are expanded, the new procurement occurs in future years. The cumulative effect of inflation over a five-to-ten-year period then drives unit costs upward.

Cost Growth Measured by Procurement Unit Cost

After adjustments for quantity changes and additions and deletions of programs, the December SAR still reported an increase of $22.7 billion in the cost of 46 systems at the quantities programmed in the September SAR. Among the best measures of the effect this cost growth has had on SAR programs is the change in average unit costs for procurement in 1982 and the remaining years of the program (future procurement unit costs). Sum-

mary Table 2 shows the percentage increases in unit prices and their effect on total program costs for ten systems that had no quantity increases in the December SAR.

For these ten systems, the primary causes of cost growth fall into four categories: unanticipated inflation, schedule changes, estimating changes, and engineering modifications. For three systems, over 50 percent of the

SUMMARY TABLE 2. INCREASES IN FUTURE PROCUREMENT UNIT COSTS FOR SELECTED SAR PROGRAMS (In millions of dollars)

	Percent Increase	Dollar Impact on Total Program Cost
Pershing II Missile	93	1,022
Defense Satellite Communications System	65	500
AH-64 Helicopter	54	1,329
Sparrow Missile, Navy	38	322
NAVSTAR Global Positioning System	28	294
IR Maverick Missile	17	659
Fighting Vehicle	17	1,621
AV-8B Aircraft	16	1,316
F/A-18 Aircraft	15	4,383
HARM Missile, Air Force	14	486

NOTE: Increase from the September 1981 SAR to the December 1981 SAR in the average unit costs for procurement in 1982 and the remaining years of the program.

SOURCE: Compiled by CBO from the September 30, 1981, and December 31, 1981, SARs.

cost growth was the result of revised economic indexes. For six systems, estimating and schedule changes together caused most of the unit price increases. For one system, engineering changes accounted for 93 percent of the overall change in unit price.

Cost growth for the units to be procured just in 1983 is even higher for selected programs. For the ten SAR systems shown in Summary Table 3, the

SUMMARY TABLE 3. INCREASES IN 1983 PROCUREMENT UNIT COSTS FOR SELECTED SAR PROGRAMS (In millions of dollars)

System	Percent Increase	Decline in Buy Size (percent)	Dollar Impact on 1983 Budget
HARM Missile, Air Force	152	74	97
Pershing II Missile	120	32	272
Phoenix Missile	104	60	127
AH-64 Helicopter	73	38	348
Sparrow Missile, Navy	42	43	40
AV-8B Aircraft	40	25	204
HARM Missile, Navy	39	16	50
Patriot Missile	35	34	211
Sparrow Missile, Air Force	25	9	39
IR Maverick Missile	18	30	51

NOTE: Increase from March 1981 to December 1981. Unit prices exclude initial spares and advance procurement funding adjustments.

SOURCE: Compiled by CBO from the March 1981 Congressional Data Sheets and data in the February 1982 Procurement Programs (P-1), which correspond to the December 1981 SAR.

increases in unit prices between March and December 1981 have led to an increase of $1.4 billion in the 1983 budget authority. Underlying this increase was a decision to reduce procurement rates for these systems in 1983. A reduction in buy size inevitably increases unit costs.

DoD Initiatives to Control Cost Growth

The Administration has taken several steps to control acquisition mangement within DoD, and some favorable results of these efforts are apparent in the December SAR.

In press releases accompanying the President's budget in February, the Administration claimed SAR system savings of $4.2 billion from improved acquisition management. Specific initiatives cited included the establishment of more economic production rates, multiple-year procurement, elimination of marginal programs, and selection of lower-cost alternatives. Unfortunately, as the December SAR acknowledges, these savings were offset to some extent by schedule delays and program stretchouts, causing a $3.9 billion increase in program costs.

CBO reviewed the four 1981 SARs to determine whether the savings claimed by DoD appeared in the SAR tabulations. The SAR data reported savings of $5 billion, or $800 million more than the DoD had claimed. For individual systems, however, CBO found substantial overreporting or underreporting. The SAR substantiated DoD's claimed savings of $2.3 billion for a group of seven systems. For six other systems where DoD claimed five-year savings of $1.5 billion, only $300 million could be supported on the basis of SAR data. And in eight additional systems, the SAR reported savings of $1.9 billion where DoD claimed only $400 million.

Clearly, the SAR does not contain data adequate to enable CBO to review the Administration's claims of management efficiencies.

Potential Cost Growth

Numerous indications of potential cost growth are to be found in the December SAR. One potential problem is the level of projected inflation. Projections of inflation by the Office of Management and Budget and the Office of the Secretary of Defense have been revised upward since the September SAR, bringing them more nearly in line with CBO inflation rate projections. Although these have been applied in the December SAR, system costs are still below CBO's current inflation assumptions. Use of the

CBO inflators would add a total of $15.5 billion to DoD's projections in the December SAR. Planned equipment delivery schedules have slipped for 17 systems. Also, 16 systems have experienced delays in completing major schedule milestones.

COMPLETENESS AND ACCURACY OF THE SAR

In addition to its efforts to control acquisition cost growth, DoD has taken steps to improve SAR reporting. In several respects, however, the SAR is still inaccurate.

Inflation Estimates

A persistent problem is the SAR's treatment of unanticipated inflation and its effect on program cost. DoD has improved the inflation accounting in the December SAR by employing special inflators for most major weapons systems. By forecasting that these inflators will increase at higher rates than the overall GNP deflator, DoD has enhanced the realism of its budget projections. It appears, however, that program managers still have difficulty in applying these accurately. For example, four systems show errors in computation totaling $4 billion. Many other systems show errors of lesser order of magnitude.

Adjustment to Offset New Economic Indexes

Indeed, the extent to which the December SAR understates inflation costs may be greater than $15.5 billion. CBO found 14 systems whose total estimated program costs were arbitrarily adjusted downward "due to refinement of estimate to offset new economic indices." In essence, this means that for these 14 systems SAR program costs were further understated by $3.4 billion.

Incomplete Estimates

The combined SAR cost estimate for 13 systems excludes at least $7 billion that should be counted as part of total program costs. In addition, several programs are not reported in the SAR even though they meet the established financial criteria for inclusion. Among these programs are the MX missile and MX base construction ($28 billion), the Trident II missile ($2.7 billion), and the battleship reactivations ($1.8 billion).

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CHAPTER I. TOTAL COST CHANGES IN SAR PROGRAMS (FOURTH QUARTER 1981)

The dramatic increases in budget authority and outlays for defense programs in the President's budget proposal for fiscal year 1983 highlight the need for careful Congressional scrutiny of procurement management. Cost growth in the acquisition of weapons systems continues to be large and to present budget and management problems.

One of the most comprehensive sources of data on the costs of defense weapons systems is the Selected Acquisition Report (SAR), which the Department of Defense (DoD) submits quarterly to the Congress. The SAR is a compilation of status reports from the program managers for the major defense acquisition programs. Each program manager presents his current "best estimate" of key goals regarding performance, schedule, and cost for the total program. The SAR is submitted to the Congress in two stages--an advance or preliminary copy, and a final version that follows within 15 days of the advance submission.

The most recent SAR is dated December 31, 1981. Data in that SAR correspond to the President's 1983 budget proposal submitted to the Congress in February 1982. Forty-seven systems are included in the December SAR, and they account for 48 percent of the Administration's overall defense procurement request of $88.7 billion.

Between the September 1981 SAR and the December 1981 SAR, total costs of the systems included rose by 50 percent, or $150.1 billion--the largest quarterly increase ever reported (see Table 1). The $150 billion increase is attributable to three factors: net quantity changes in programs; the addition or deletion of programs included in the SAR; and net changes caused by cost growth.

This chapter reviews the buildup in total costs of the weapons systems included in the December 1981 SAR. The next chapter analyzes cost growth in the systems separately.

COST CHANGES CAUSED BY QUANTITY CHANGES

The expansion of defense programs accounted for $99.2 billion, or 66 percent of the total increase in SAR costs. Two-thirds of this increase

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reflects the planned procurement cost of additional tactical aircraft. Large increases are also planned in ship and missile procurement. Table 2 presents the quantity changes by weapons system.

Tactical Aircraft

The planned orders for three tactical aircraft programs--the F-14, F-15, and F-16--increased by 1,567 at an added cost of $66.2 billion. Ordinarily such an increase would not be particularly noteworthy since each of the three is a well-established, proven aircraft system. The SAR suggests, however, that what is involved is not continued production of the aircraft as they are currently designed but rather development of three substantially different versions of them. Despite this, there is little or no material in the SAR with which the Congress could evaluate the cost-effectiveness of the changes.

TABLE 2. QUANTITY-RELATED CHANGES IN SAR COSTS BY WEAPONS SYSTEM (In billions of dollars)

System	Quantity Change	Cost Change
Tactical Aircraft		
F-14	336	23.1
F-15	630	24.7
F-16	601	18.4
E-3A	11	1.7
Total	1,578	67.9
Ships		
Attack Submarine	12	10.9
Guided Missile Frigate	9	3.8
Guided Missile Cruiser	3	3.6
Nuclear Aircraft Carrier	2	7.4
Total	26	25.7
Missiles		
Sea-Launched Cruise Missile	3,350	9.4
Air-Launched Cruise Missile	930	1.4
Harpoon	1,129	1.4
Phoenix	1,302	1.2
HARM	884	0.3
Patriot	1,944	1.4
Total	9,539	15.1
Quantity Growth in Other Programs	--	0.5
Programs Reduced or Terminated	--	-10.0
Grand Total		99.2

NOTES: Changes between September 1981 and December 1981. Cost change includes all changes resulting from the decision to acquire additional units.

SOURCE: Compiled by CBO from September 30, 1981, and December 31, 1981, SARs.

The decision to develop new versions of existing systems is apparently the result of a DoD procurement strategy called preplanned product improvement. The second of DoD's 32 management initiatives, this involves a slow evolutionary redesign of an aircraft or other weapons system over its production life rather than the large, risky technological jump that has been associated with most large U.S. systems in the past. Evidence of this intent may be seen in the material on the F-15, in which the program manager notes that an attack version of the present fighter aircraft is envisioned. There are references to development of a heavier version of the F-16 aircraft, which would presumably bring it closer in cost and capability to the F-15. To carry out these evolutionary developments, between $2 billion and $4 billion worth of engineering changes are planned for each system.

A serious weakness of the SAR presentation for these major program changes is that the costs of engineering changes are specified, but the proposed changes themselves are at best only vaguely defined. Without suggesting that the proposed changes are either necessary or unnecessary, it is possible to say that there is less material with which to make such an evaluation than would be available if three new aircraft systems were proposed.

Ships

The increases for ships were, for the most part, not unexpected. Unlike aircraft procurement plans, which can extend beyond the DoD Five Year Defense Plan (FYDP), ship plans have historically extended only through the FYDP. The September SAR included ship orders planned for the 1982-1986 FYDP plus those for earlier years. The December SAR extends to 1987, since the present FYDP spans 1983-1987. The added costs associated with this planning convention are $9.4 billion for 11 ships in 1987.

The major programmatic increases are the $7.4 billion added for two aircraft carriers, both to be procurred in fiscal year 1983. This decision also represents a departure from previous procurement strategy in which plans were submitted for one carrier at a time, at three- or four-year intervals.

A second programmatic change has been the addition of 13 other ship orders at a cost of $8.9 billion during 1983-1986. These new ships, combined with the two aircraft carriers mentioned above, reflect the Administration's decision to increase the pace of ship procurement in order to reach an announced goal of 600 ships by the early 1990s.

Missiles

In missile programs, the two most striking features are the quadrupling of planned Tomahawk missile procurement and the emphasis placed on procurement of long-range strike missiles. The $9.4 billion increase in Tomahawk cruise missiles is related to the decision to place them on a far greater number of ships and submarines in an attempt to expand force capability in a relatively inexpensive way. In all, 3,350 missiles have been added to the Tomahawk program.

Four of the six missile programs involved are Navy programs, but the focus on long-range strike missiles is the most significant development. The three largest increases are in long-range missile programs: Tomahawk, Air-launched Cruise Missile (ALCM), and Harpoon. Of the three, only the Harpoon is fired by tactical aircraft. There is a marked inconsistency between the changes in short-range tactical fighter missiles and the large additions to the F-14, F-15, and F-16 fighter programs. So far as quantity increases are concerned, the emphasis is on out-of-sight, stand-off weapons rather than on close-in, visual attack or defense weapons.

COST CHANGES CAUSED BY ADDITION OR DELETION OF PROGRAMS

Two small systems totaling $1.3 billion were dropped from the SAR. One program was added--the B-1B bomber, with a projected acqusition cost of $29.5 billion for 100 aircraft. 1/ The net increase in SAR total cost from these changes was $28.2 billion, or 19 percent of the overall increase. In its early years the B-1B will be a competitor to the long-range strike missiles discussed above, insofar as the B-1B mission is to penetrate enemy air defenses.

1/ Different estimates for the B-1B program have been presented by CBO and the General Accounting Office (GAO). The Washington Post reported on April 15, 1982, that the GAO may take DoD to court to obtain an internal DoD estimate prepared by the Cost Analysis Improvement Group (CAIG). The Post reports that the CAIG put the B-1B program cost at between $27 billion and $28 billion in constant dollars, or $7 billion more then the official estimate of $20.5 billion. In current dollars, the CAIG estimate would be roughly $40 billion, or very near CBO's earlier estimate for the program.

COST CHANGES CAUSED BY COST GROWTH

A relatively small proportion, about 15 percent, of the total program growth of $150 billion is attributable to cost growth caused by factors other than quantity changes or additions and deletions. These factors include engineering, estimating, schedule, economic, support, or other changes in the program as they were planned in the September SAR. The total net cost growth resulting from these factors is $22.7 billion. The next chapter of this report will deal with this cost growth.

CHAPTER II. CONTINUED COST GROWTH IN INDIVIDUAL SYSTEMS

During its first year in office, the Administration recognized serious management problems in the acquisition of major weapons systems. It announced a set of initiatives designed to improve the acquisition process, including initiatives to provide better control of costs. The SAR data can be used to evaluate progress in the cost area. This chapter analyzes cost growth in specific weapons systems, and discusses:

- o DoD's success in controlling cost growth over the past year, including a review of programs that have exceeded Nunn Amendment thresholds.
- o DoD's efforts to reduce cost growth through four of its acquisition initiatives.
- o Indications of potential future cost growth.

UNIT COSTS AND THE NUNN AMENDMENT

In the fiscal year 1982 Defense Authorization Act, a two-tiered reporting requirement was established to identify programs that have significant unit cost growth. The purpose is to provide a means by which the Congress can become aware of cost growth early enough to take remedial action. The baseline for these reports is the costs presented in the March 1981 SAR. The so-called Nunn Amendment requires that service secretaries report the following information: programs in which the total program acquisition unit cost is over 15 percent above the level of March 1981; and programs in which the procurement unit cost for fiscal year 1982 is over 15 percent above the level of March 1981. If unit cost growth exceeds the baseline by 25 percent or more, the Secretary of Defense must make a written certification pertaining to the system requirement within 30 days after the report by the service secretary. All thresholds are measured in current rather than constant dollars. Authority to obligate funds for a program is automatically terminated if the service secretary does not submit a report within 30 days or if the Secretary of Defense fails to certify the system requirement within 60 days of the reported breach. The Senate Armed Services Committee has asked the CBO to review weapons systems acquisition with regard to the Nunn Amendment.

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In the December 1981 SAR, 22 systems showed unit cost increases exceeding 15 percent, some in both reporting categories. (The number of systems is 23 if the Trident submarine and missile are counted as separate systems.) Two of these systems were not reported by DoD (see Table 3).

Seventeen systems exceeded one of the unit cost thresholds by more than 25 percent. No service had a significantly larger number of threshold breaches than any other.

Causes of Unit Cost Increases

The primary causes of the unit cost growth in the programs that exceeded the thresholds of the Nunn Amendment are three: increases in program size; program reductions or terminations; and cost growth in previously planned programs.

Seven of the threshold breaches were caused primarily by increases in the planned program quantities. Since these occur in future years, when prices are expected to be higher, they necessarily raise unit costs for the entire program. Five other breaches resulted primarily from program termination or substantial reduction in the number of units to be procured.

The ten threshold breaches that did not directly result from changes in the planned orders were caused by factors such as schedule delays, inefficient production rates, engineering changes, underestimation of costs, and unanticipated inflation.

Unreported Breaches of Nunn Amendment Thresholds

Two apparent breaches included in Table 4 were not reported by DoD--the ALCM missile, and the Trident submarine.

The SAR total estimate for the ALCM missile does not include the costs of the ALCM-C improvement program, which total $1.9 billion. These costs are included in the Congressional Data Sheets as part of the ALCM program. Including them causes this program to exceed the total program acquisition unit cost threshold by 34 percent. Since the costs of changes in aircraft have been included in programs such as the F-14, F-15, and F-16, there is ample precedent for inclusion of ALCM-C in the ALCM SAR estimate.

TABLE 3. NUNN AMENDMENT THRESHOLD BREACHES

System	Percentage Above 1982 Procurement Unit Cost	Percentage Above Total Program Acquisition Unit Cost
Army		
Patriot Missile	--	27
Pershing II Missile	30	57
Hellfire Missile	47	--
AH-64 Helicopter	49	48
Roland Missile	--	143
Navy		
F-14 Aircraft	--	79
Phoenix Missile	--	19
Sidewinder Missile	34	--
Sparrow Missile	94	32
Trident a/		
Trident Submarine	--	15 b/
Trident I Missile	--	36
SSN-688 Submarine	17	31
FFG-7 Frigate	--	17
Five-Inch Guided Projectile (SAL)	--	2,215
Air Force		
A-10 Aircraft	28	--
F-15 Aircraft	--	46
F-16 Aircraft	--	41
IR Maverick Missile	--	16
Defense Satellite Communications System	--	47
ALCM Missile	--	34 b/
Sparrow Missile	67	25

SOURCE: Compiled by CBO from data supplied by the Department of Defense.

a/ One SAR is submitted covering both the Trident submarine and the Trident I missile.

b/ Unreported breaches.

The Trident submarine program unit cost is more than 15 percent greater in December than in March 1981. This is only a technical violation, since the December SAR total program estimate includes the cost of military construction related to the Trident submarine but the March 1981 SAR did not. Since construction costs have not changed, the program has not exceeded the threshold; it would have, however, if the Navy had not decreased the estimate by $784 million to offset the new inflation index. If nothing else, the case of the Trident illustrates the manner in which total program costs as presented in the SAR have been understated for many systems.

In a third case, unit cost increased by more than 15 percent, but not over the time span specified in the Nunn Amendment. The AV-8B unit cost increased 16 percent between its first listing in the SAR of June 1981 and December 1981. New economic indexes and new support requirements caused this increase. Technically this is not a breach of the threshold since the AV-8B was not included in the March 1981 SAR. If the Nunn Amendment provisions are extended beyond 1982, however, to become a permanent reporting tool, cases such as the AV-8B would presumably be found to exceed the threshold.

Programs Near the Threshold

As of December 1981, five programs were within three percentage points or less of violating the 15 percent total program acquisition unit cost threshold. These are the Fighting Vehicle, NAVSTAR Global Positioning System, HARM missile, F/A-18 aircraft, and LAMPS MK III aircraft system.

This review of unit cost threshold breaches suggests that costs continue to rise, in some cases substantially, despite attempts at better program acquisition management.

COST GROWTH MEASURED BY PROCUREMENT UNIT COST

After adjustments for quantity changes and addition and deletion of programs, the December SAR still reported a net increase of $22.7 billion in the cost of 46 systems. Among the best measures of the effect of this cost growth on SAR programs is the change in procurement unit costs.

The advantage of looking at unit costs is that a large amount of cost growth spread over several years is by itself difficult to evaluate, but unit

costs provide some perspective for such an evaluation. The Nunn Amendment provides two measures of unit cost growth--that for the total program and that for fiscal year 1982. Another measure of cost growth is "future procurement unit costs"--that is, the average unit cost for planned procurement in 1982 and the remaining years of the program.

Future Procurement Unit Costs

Table 4 shows the increases in future procurement unit costs between the September and December 1981 SARs for ten systems. It also shows the impact of this growth in unit costs on the total cost of the program. These ten systems were selected because there were no changes in their total planned quantities. With quantity removed as a factor, all cost growth is due to changes in the programs as they were planned in September.

Future procurement unit costs were determined by dividing the procurement dollars planned from 1982 to the end of each program by the number of units to be procured during the period. Unit cost increases were determined by dividing the procurement unit cost as of December by the procurement unit cost as of September. The total dollar impact was determined by subtracting total procurement cost for 1982 and beyond as planned in September from that as planned in December.

For these ten systems, the primary causes of cost growth fall into four categories: unanticipated inflation, schedule changes, estimating changes, and engineering modifications. For three systems, over 50 percent of the cost growth was the result of revised inflation indexes. For six systems, estimating and schedule changes together caused most of the unit price increases. For one system, engineering changes accounted for 93 percent of the overall change in unit cost.

These ten cases are not limited to any particular system type; aircraft, missiles, tracked vehicles, and communications systems are all included. Nor are they all systems in the early stages of development. Five of the ten systems in Table 4 have been in procurement for three or more years.

1983 Procurement Unit Costs

Unit cost growth between the September and December SARs for just those units to be procured in 1983 is even higher for selected programs. The ten systems shown in Table 5 are not necessarily those with the largest increases in projected budget year 1983 unit costs. They were chosen in

TABLE 4. INCREASES IN FUTURE PROCUREMENT UNIT COSTS FOR SELECTED SAR PROGRAMS (In millions of dollars)

System	Percent Increase	Dollar Impact on Total Program Cost
Pershing II Missile	93	1,022
Defense Satellite Communications System	65	500
AH-64 Helicopter	54	1,329
Sparrow Missile, Navy	38	322
NAVSTAR Global Positioning System	28	294
IR Maverick Missile	17	659
Fighting Vehicle	17	1,621
AV-8B Aircraft	16	1,316
F/A-18 Aircraft	15	4,383
HARM Missile, Air Force	14	486

NOTE: Increase from the September 1981 SAR to the December 1981 SAR in the average unit costs for procurement in 1982 and the remaining years of the program.

SOURCE: Compiled by CBO from the September 30, 1981, and December 31, 1981, SARs.

order to demonstrate the impact that just one program change can have on program costs--in this case, a reduction in program buy sizes. Though a reduction in buy size clearly increases unit cost growth, there are both good and bad reasons for making such a change. Self-imposed budget limitations, and delays to correct engineering problems prior to production, are only two of several possible reasons. The result, however, is in conflict with DoD's management objective of achieving and maintaining economic production levels.

TABLE 5. INCREASES IN 1983 PROCUREMENT UNIT COSTS FOR SELECTED SAR PROGRAMS (In millions of dollars)

System	Percent Increase	Decline in Buy Size (percent)	Dollar Impact on 1983 Budget
HARM Missile, Air Force	152	74	97
Pershing II Missile	120	32	272
Phoenix Missile	104	60	127
AH-64 Helicopter	73	38	348
Sparrow Missile, Navy	42	43	40
AV-8B Aircraft	40	25	204
HARM Missile, Navy	39	16	50
Patriot Missile	35	34	211
Sparrow Missile, Air Force	25	9	39
IR Maverick Missile	18	30	51

NOTE: Increase from March 1981 to December 1981. Unit prices exclude initial spares and advance procurement funding adjustments.

SOURCE: Compiled by CBO from the March 1981 Congressional Data Sheets and data in the February 1982 Procurement Programs (P-1), which correspond to the December 1981 SAR.

Unit cost increases for Table 5 were determined by dividing the 1983 procurement unit cost as found in the March 1981 Congressional Data Sheets by the 1983 procurement unit cost as found in the February 1982 Procurement Programs (P-1) book. The percentage declines in buy size were determined from the same sources. The dollar impact for 1983 was determined by taking the difference between the two unit costs times the new quantity for 1983.

As was the case for Table 4, the growth in unit costs for 1983 is not limited to new programs. For example, the Air Force HARM missile, in development since 1978, has unit cost growth of 152 percent with a decline in buy size of 74 percent. The Navy Phoenix missile, in production since 1972, has a 1983 unit cost growth of 104 percent with a 60 percent decline in buy size. In 1983 budget authority, the effect of these changes is an increase of $1.4 billion dollars for all ten systems.

DOD INITIATIVES TO CONTROL COST GROWTH

The data in the foregoing tables show that there are still areas of substantial cost growth. The Administration has taken several steps, however, to control acquisition management within DoD, and some favorable evidence of this effort is apparent in the recent SARs.

Reported Savings

In releasing the President's budget, the Administration stated that improvements in the acquisition process would yield savings totaling $13.8 billion between 1982 and 1987. It claimed savings of at least $4.2 billion for SAR weapons systems from the following acquisition initiatives:

- Economic production rates;
- Multiyear procurement;
- Elimination or reduction of marginal programs; and
- Lower-cost alternatives.

CBO reviewed the four 1981 SARs to determine whether the savings claimed by DoD appeared in the SAR tabulations, and found savings of almost $5 billion--$800 million more than the Administration's total (see Table 6). There was, however, substantial overreporting or underreporting for individual systems.

Since the DoD savings claim covers only 1982-1987, and the SAR covers all the years of each program, the comparisons cannot be precise. For seven systems, the SARs showed at least $2.7 billion in savings as compared with $2.3 billion claimed in DoD press releases. The SAR numbers then appear to be sufficient to substantiate the savings claimed for these systems. For six other systems, however, only $332 million in savings

TABLE 6. SAVINGS IN SAR PROGRAMS RESULTING FROM ACQUISITION INITIATIVES (In millions of dollars)

	Savings Claimed by DoD for 1982-1987	Savings Reported in 1981 SARs for the Total Program
Savings Substantiated		
UH-60 Helicopter a/	81	109
Fighting Vehicle	236	240
F-14 Aircraft	71	71
F/A-18 Aircraft b/	92	251
F-16 Aircraft	993	1,178
E-4 Aircraft	570	588
NAVSTAR GPS/IONDS	249	277
Subtotal	2,292	2,714
Savings at Least Partially Unsubstantiated		
Hellfire Missile	190	117
Harpoon Missile	141	133
CVN Aircraft Carrier	754	0
F-15 Aircraft	126	0
E-3A Aircraft	213	73
Sidewinder Missile, Air Force	74	9
Subtotal	1,498	332
Savings Understated		
CH-47 Helicopter	0	376
UH-60 Helicopter a/	0	54
AH-64 Helicopter	0	230
Copperhead	0	108
DIVAD Gun	313	666
Multiple Launch Rocket System	64	322
F/A-18 Aircraft b/	0	81
HARM Missile, Navy	0	101
Subtotal	377	1,938
Total	4,167	4,984

SOURCES: DoD press release dated February 1982, and SARs submitted to the Congress during 1981. SAR data compiled by CBO.

a/ Savings substantiated were those resulting from multiyear procurement, while savings understated were those resulting from more economic production rates.

b/ Savings substantiated resulted from a lower-cost alternative while savings understated resulted from more economic production rates.

were found as against $1.5 billion claimed in press releases. For another eight systems, DoD's claimed savings appear to be understated by at least $1.5 billion.

While DoD has evidently made progress in raising the efficiency of its procurement management, the data contained in the SAR do not permit a complete assessment of that progress so far.

Program Stretchouts

While the SAR substantiates many savings claimed from increasing production rates to more economic levels, it also provides ample evidence that the production rates for many programs have been slowed--at a large cost penalty. A program stretchout occurs when (1) the procurement schedule is changed so that weapons system orders are moved from the early years of a program to the outyears, or (2) a program is extended beyond the period for which it was planned without increasing quantities. Table 7 shows that 22 SAR systems, or nearly half, have incurred program stretchouts that have increased costs by $3.9 billion. Stretchouts increase costs because production levels become less economic, or because the shift of production from earlier years to later years increases the exposure to inflation. The impact of this growth on unit cost increases was noted in a previous section of this report.

TABLE 7. INCREASED COSTS RESULTING FROM PROGRAM STRETCHOUTS (In millions of dollars)

Five Army Systems	1,039
Nine Navy Systems	2,408
Eight Air Force Systems	492
Total	3,939

NOTE: Increase from the September 1981 SAR to the December 1981 SAR.

SOURCE: Compiled by CBO from the September 30, 1981, and the December 31, 1981, SARs.

INDICATIONS OF POTENTIAL FUTURE COST GROWTH

The CBO analysis of the SAR found several possible sources of future cost growth.

Application of CBO Indexes

When CBO economic assumptions were applied to the costs of completing the SAR programs, it appeared that the estimates for 14 systems may have been understated by as much as $15.7 billion. Table 8 identifies these systems. The net understatement for all 47 SAR systems could reach $15.5 billion.

Schedule Slippage

One measure of schedule performance is the degree to which contractors are meeting the planned delivery schedules. Table 9 shows that as of December 30, 1981, 17 systems, or more than one-third of those covered by the SAR, were behind their development and/or procurement delivery schedules. The costs of getting back on schedule may be minimal; but they can be substantial if overtime is required, or if technical difficulties, strikes, or shortages occur.

Another measure of schedule performance is the degree to which a system is completing its key program milestones on time--for example, such milestones as completion of testing, a decision to undertake production, or the awarding of contracts. The CBO review of the December SAR revealed that 16 systems, or over one-third, had experienced delays in completing some of these milestones. Table 9 shows the number of schedule milestones slipped for each system since the September SAR. The amount of time involved in a slip ranged from one to six months. More detailed information on schedule delays for each weapons system may be found in Appendix B of this report. For some systems, the reason for the schedule delay is often more revealing as an indicator of potential future cost growth than the delay itself.

Other Indications of Cost Growth

The SAR is primarily an historical document, and necessarily throws more light on the past than on the future. Nevertheless, the SAR contains scattered hints that future cost estimates will be higher. These range from statements that a program is underfunded to footnotes indicating that a contractor is having cost and schedule problems. CBO has found such indications for about half of the systems. These are detailed in Appendix B.

TABLE 8. COSTS OF COMPLETING SELECTED SAR PROGRAMS USING ADMINISTRATION AND CBO ECONOMIC ASSUMPTIONS FOR FISCAL YEARS 1983 AND BEYOND (In millions of dollars)

System	Costs Using Administration Assumptions	Costs Using CBO Assumptions	Difference
Army			
CH-47 Helicopter	2,626	2,813	187
UH-60 Helicopter	5,094	5,475	381
AH-64 Helicopter	5,639	5,872	233
Navy			
F-14 Aircraft	24,759	27,887	3,128
F/A-18 Aircraft	31,241	33,657	2,416
AV-8B Aircraft	8,907	9,455	548
Trident	11,124	11,596	472
SSN-688 Submarine	12,679	13,425	746
CG-47 Cruiser	20,808	22,392	1,584
FFG-7 Frigate	5,282	5,605	323
Air Force			
F-15 Aircraft a/	25,465	27,429	1,964
F-16 Aircraft	30,606	33,118	2,512
E-3A Aircraft	2,174	2,285	111
B-1B Aircraft	27,226	28,278	1,052
Total Difference			15,657

SOURCE: Compiled by CBO from data supplied by the DoD and CBO's economic assumptions.

a/ Costs of completing the F-15 were taken from the advance SAR because the final SAR submission for this system had not been made as of the date of this report.

TABLE 9. SCHEDULE PERFORMANCE FOR SAR PROGRAMS AS OF DECEMBER 31, 1981

System	Number of Schedule Milestones Delayed	System Behind Delivery Schedule
Army		
Patriot Missile	3	No
Pershing II Missile	--	Yes
Hellfire Missile	4	Yes
AH-64 Helicopter	3	No
Fighting Vehicle	--	Yes
M-1 Tank	1	Yes
Roland Missile	--	Yes
Copperhead	1	Yes
Multiple Launch Rocket System	--	Yes
Navy		
F-14 Aircraft	1	No
AV-8B Aircraft	1	Yes
LAMPS MK III	2	No
CAPTOR Torpedo System	--	Yes
HARM Missile	3	No
Phoenix Missile	1	No
Sparrow Missile	--	Yes
Tomahawk Missile	3	Yes
Trident Missile	--	Yes
SSN-688 Submarine	--	Yes
CVN Carrier	3	No
Air Force		
F-15 Aircraft	--	Yes
EF-111A Aircraft	1	Yes
IR Maverick Missile	4	Yes
NAVSTAR Global Positioning System	5	Yes
GLCM Missile	3	No

SOURCE: Compiled by CBO from the December 31, 1981, SAR.

CHAPTER III. COMPLETENESS AND ACCURACY OF THE SAR

This chapter evaluates the accuracy and completeness of the cost and program data as presented in the SAR, with special attention to the application of inflation indexes.

INFLATION ESTIMATES

The treatment of inflation has been a major issue in previous CBO reviews of the SAR. Although inflation is overshadowed by other issues in this report, it continues to be important. This section discusses two inflation issues in the December SAR:

- The application of the inflation indexes prescribed by the Office of the Secretary of Defense (OSD);
- The inflation adjustment for fiscal year 1983.

Application of OSD Indexes

Previous CBO reviews of the SAR have focused on the many apparent misapplications of OSD inflation indexes. The December SAR contains only four systems that show substantially more inflation than would be expected from the application of OSD indexes. Specifically, the estimates for the SSN-688 submarine, the CG-47 cruiser, the FFG-7 frigate, and the F-16 aircraft may be overstated by as much as $4.0 billion. The estimate for the SSN-688 submarine contains an implict inflation rate of 42 percent from 1983 to 1984. Since that SAR was submitted, the Navy program office has informally provided corrected data for the SSN-688 lowering the implicit rate of inflation to 4 percent. Other weapons systems show lesser discrepancies in the application of OSD inflation indexes.

Inflation Adjustment for 1983

A comparison of the inherent weighted inflation indexes for fiscal year 1983 presented in the September and December 1981 SARs should provide relatively consistent differences in escalation rates for like systems, such as

aircraft. There appear to be major inconsistencies, however. Table 10 shows that the increases for aircraft procurement ranged from 1.6 percent to 11.5 percent. Increases for missile procurement ranged from a negative 22.1 percent to a positive 12.6 percent, and those for shipbuilding ranged from a negative 4.9 percent to a positive 15.8. The only service showing relative consistency was the Air Force, where differences ranged from 4 percent to 6.2 percent for aircraft and missile systems. Army and Navy officials were unable to explain these apparent inconsistencies.

ADJUSTMENT TO OFFSET NEW ECONOMIC INDEXES

The DoD and the Office of Management and Budget (OMB) recently revised upward their economic indexes for inflating the costs of major defense procurement programs--ships, aircraft, missiles, and tracked vehicles. The purpose of this change was to reflect more accurately defense industry economic conditions, which in turn affect program costs. However, the SARs for 14 systems cited an estimating change that reduced program costs in order to "offset the new economic indices." Altogether some $3.4 billion in adjustments were made for one Army, three Air Force, and ten Navy programs. These adjustments were made because total program costs resulting from the application of the new economic indexes exceeded the budgetary ceilings set by the Office of the Secretary of Defense during the fiscal year 1983 budget process. In other words, the OSD budget constraints clashed with the most recent OSD view of future economic conditions as applied to these SAR programs. These reductions are merely adjustments to force total costs for a program to meet OSD's budget ceiling for that program. As a result, the costs in 15 SAR programs are understated by a total of $3.4 billion.

COSTS EXCLUDED FROM THE SAR

The SAR cost estimates for 13 systems exclude at least $7 billion in program costs--notably for military construction. These funds should be included in the estimates. With one exception, they were included in the February 1982 Congressional Data Sheets. The exception is an estimated $700 million for the B-1B bomber, which was footnoted in the December SAR as $517 million in constant dollars. A breakdown of the systems and dollars involved can be found in Appendix A.

TABLE 10. CHANGES IN INHERENT 1982 PROCUREMENT INFLATION INDEXES FROM SEPTEMBER SAR TO DECEMBER SAR

System	Percent Increase or Decrease (-)
Aircraft	
Army	
CH-47 Helicopter	4.2
UH-60 Helicopter	11.4
AH-64 Helicopter	11.5
Navy	
F-14	7.6
F/A-18	1.6
AV-8B	7.7
Air Force	
F-15	5.3
F-16	4.4
E-3A	6.2
EF-111A	4.2
Missiles	
Army	
Patriot	1.8
Hellfire	6.1
Roland	3.3
Multiple Launch Rocket System	5.6
Pershing II	12.6
Navy	
HARM	-0.7
Harpoon	-22.1
Phoenix	7.0
Sidewinder	4.3
Sparrow	4.1
Tomahawk	7.2
Trident	7.1
Air Force	
IR Maverick	4.1
ALCM	4.0
GLCM	4.2
HARM	4.2
Sidewinder	4.3
Sparrow	4.2
Shipbuilding	
Trident	15.8
SSN-688	-4.9
CG-47	7.8
FFG-7	3.1

SOURCE: Compiled by CBO from data in the September 30, 1981, and December 31, 1981, SARs.

PROGRAMS NOT INCLUDED IN THE SAR

Public Law 94-106 requires that SARs include major defense systems, defined as those requiring in excess of $75 million for research, development, test, and evaluation, or a production investment in excess of $300 million. Several weapons programs that meet these criteria are not regarded as major weapons systems by DoD. Among the excluded programs are:

- Battleship reactivations--$1.8 billion;
- MX missile and MX base construction--$28 billion;
- Trident II missile--$2.7 billion;
- KC-135 reengining--at least $6 billion;
- B-52 Offensive Avionics Suite Program and cruise missile modifications--costs unknown;
- Space Transportation System/Inertial Upper Stage (Air Force contribution)--costs unknown;
- Low Altitude Navigation and Targetting Infrared for Night (LANTIRN) program--costs unknown;
- DDG-51--$6.3 billion;
- Light Armored Vehicles (Army and Marine versions)--$1.5 billion.

CBO belives that these are major systems and should be included in the quarterly SARs.

APPENDIXES

APPENDIX A. SUMMARY TABLES OF DECEMBER 1981 SAR PROGRAM CHANGES

This appendix contains three tables summarizing changes in SAR weapons systems between September and December 1981. Table A-1 covers Army program changes, Table A-2 Navy program changes, and Table A-3 Air Force program changes. The systems are listed in the order given in the SAR.

The following terms used in the tables require definition:

Cost Growth. Cost increases in the December SAR resulting from engineering, estimating, schedule, economic, support, or other changes in SAR programs as they were planned in the September SAR.

Quantity Changes. Cost increases resulting from the decision to buy additional units (including changes from engineering, estimating, schedule, economic, support, or other).

Nunn Amendment. Cost increases beyond the threshold of 15 percent above the unit costs contained in the March 31, 1981, SAR; also, cost increases within three percentage points of the threshold.

Program Stretchout. The cost impact of schedule delays. Support impact has been included when possible.

Savings. Claimed savings are those cited by DoD as resulting from several management initiatives. SAR savings are those identified by CBO from data in the four SARs submitted in 1981. Management initiatives include: economic production rates; multiyear procurement; lower-cost alternatives; and elimination/reduction of marginal programs.

Costs Excluded from SAR. Program costs that were not included in the SAR total cost estimate. The costs for Army and Navy systems were primarily for military construction while the costs for Air Force systems were primarily for procurement and development.

Indications of Future Growth. For programs marked X, see Appendix B for detailed remarks.

Offsets from Inflation Indexes. Adjustments downward in costs "due to refinement of estimate to offset new economic indices."

TABLE A-1. DECEMBER 1981 SAR PROGRAM CHANGES, ARMY (In millions of dollars)

Program	September to December Program Cost Change			Nunn Amendment Unit Cost Increases (percent)		Results of Management Initiatives				
									Program Manager a/	
	Cost Growth	Quantity Changes	Total Program	1982 Procurement	Total Program	Program Stretchout	Savings a/ SAR	Savings a/ Claimed	Date Reassigned	Tenure (months)
Patriot	871	1,372	2,243	--	27	169	--	--	--	--
Pershing II	1,018	--	1,018	30	57	215	--	--	--	--
Hellfire	185	379	564	47	--	82	117	190	--	--
CH-47	118	--	118	--	--	--	376	0	Jul 81	20
UH-60	90	--	90	--	--	--	163	81	--	--
AH-64	1,973	-552	1,421	49	48	--	230	0	--	--
SOTAS	--	-2,032	-2,032	--	--	--	--	--	--	--
Fighting Vehicle	1,825	-207	1,618	--	14	512	240	236	--	--
M-1 Tank	762	--	762	--	--	61	--	--	--	--
Roland	--	-1,963	-1,963	--	143	--	--	--	May 81	8
Copperhead	-214	7	-207	--	--	--	108	0	Aug 81	13
Divad Gun	-337	--	-337	--	--	--	666	313	--	--
MLRS	70	94	164	--	--	--	322	64	--	--

a/ Data taken from the four SARs submitted in 1981.

(Continued)

TABLE A-1. (Continued)

Program	Schedule		Costs Excluded from SAR	Indications of Future Growth	Inflation Overstated or Understated (-)		
	Number of Milestones Slipped	Delivery Slips			Offsets from Inflation Indexes	Assumptions	
						Administration	CBO
Patriot	3	--	293	X	--	--	--
Pershing II	--	X	--	X	--	--	--
Hellfire	4	X	--	--	-11	--	--
CH-47	--	--	--	--	--	--	-187
UH-60	--	--	--	--	--	--	-381
AH-64	3	--	122	X	--	--	-233
SOTAS	--	--	10	--	--	--	--
Fighting Vehicle	--	X	166	X	--	--	--
M-1 Tank	1	X	44	--	--	--	--
Roland	--	X	4	X	--	--	--
Copperhead	1	X	--	X	--	--	--
Divad Gun	--	--	146	--	--	--	--
MLRS	--	X	142	X	--	--	--

TABLE A-2. DECEMBER 1981 SAR PROGRAM CHANGES, NAVY (In millions of dollars)

Program	September to December Program Cost Change			Nunn Amendment Unit Cost Increases (percent)		Results of Management Initiatives				
									Program Manager a/	
	Cost Growth	Quantity Changes	Total Program	1982 Procurement	Total Program	Program Stretchout	Savings a/ SAR	Savings a/ Claimed	Date Reassigned	Tenure (months)
F-14	543	23,072	23,615	--	79	--	71	71	--	--
F/A-18	4,432	--	4,432	--	13	1,165	332	92	--	--
AV-8B	1,457	--	1,457	--	16b/	214	--	--	--	
Lamps MK-III										
Aircraft Systems	--	--	--	--	13	--	--	--	--	--
Ship Systems	--	--	--	--	--	--	--	--	--	--
Total	629	-241	388	--	--	--	--	--	Feb 81	27
Captor	24	--	24	--	--	11	--	--	--	--
HARM	97	348	445	--	--	--	101	0	--	--
Harpoon	8	1,354	1,362	--	--	13	133	141	--	--
Phoenix (AIM-54C)	384	1,218	1,602	--	19	22	--	--	--	--
Sidewinder (AIM-9M)	24	-9	15	34	--	--	--	--	--	--
Sparrow (AIM-7M)	327	--	327	94	32	166	--	--	--	--
Tomahawk	60	9,458	9,518	--	--	--	--	--	--	--
SAL 5-inch Guided Projectile	--	-631	-631	--	2,215	--	--	--	Aug 81	13
TACTAS	83	-107	-24	--	--	36	--	--	--	--
Trident Submarine	1,566	--	1,566	--	15c/	703	--	--	Jul 81	27
Trident I Missile	-74	-3,325	-3,399	--	36	--	--	--	--	--
SSN-688	-1,223	10,914	9,691	17	31	--	--	--	--	--
CG-47	1,871	3,560	5,431	--	--	78	--	--	--	--
FFG-7	29	3,821	3,850	--	17	--	--	--	--	--
NATO PHM	--	--	--	--	--	--	--	--	--	--
CVN-71	38	--	38	--	--	--	--	--	--	--
CVN-72/73	--	7,419	7,419	--	--	--	0	754	--	--

a/ Data taken from the four SARs submitted in 1981.

b/ First SAR was June 1981.

c/ Technical violation pending retroactive correction of March 1981 SAR.

(Continued)

TABLE A-2. (Continued)

Program	Schedule		Costs Excluded from SAR	Indications of Future Growth	Inflation Overstated or Understated (-)		
	Number of Milestones Slipped	Delivery Slips			Offsets from Inflation Indexes	Assumptions	
						Administration	CBO
F-14	1	--	--	--	--	--	-3,128
F/A-18	--	--	--	--	--	--	-2,416
AV-8B	1	X	--	--	-265	--	-548
Lamps MK-III							
Aircraft Systems	--	--	--	--	--	--	--
Ship Systems	--	--	--	--	--	--	--
Total	2	--	--	X	-21	--	--
Captor	--	X	--	X	-111	--	--
HARM	3	--	--	X	--	--	--
Harpoon	--	--	--	--	--	--	--
Phoenix (AIM-54c)	1	--	--	--	--	--	--
Sidewinder (AIM-9M)	--	--	--	--	--	--	--
Sparrow (AIM-7M)	--	X	--	X	--	--	--
Tomahawk	3	X	--	--	-354	--	--
SAL 5-inch							
Guided Projectile	--	--	--	--	-6	--	--
TACTAS	--	--	--	--	--	--	--
Trident Submarine	--	--	2,015	X	-783	--	-472
Trident I Missile	--	X	--	X	-484	--	--
SSN-688	--	X	--	X	-592	2,753d/	-746
CG-47	--	--	--	--	-303	203	-1,584
FFG-7	--	--	--	--	-317	167	-323
NATO PHM	--	--	--	--	--	--	--
CVN-71	3	--	--	X	-112	--	--
CVN-72/73	--	--	--	--	--	--	--

d/ SAR data shows 42 percent inflation between fiscal year 1983 and fiscal year 1984. Unofficial correction of the SAR data by the Navy lowers this to 4 percent.

TABLE A-3. DECEMBER 1981 SAR PROGRAM CHANGES, AIR FORCE (In millions of dollars)

Program	September to December Program Cost Change			Nunn Amendment Unit Cost Increase (percent)		Results of Management Initiatives				
							Savings a/		Program Manager a/	
	Cost Growth	Quantity Changes	Total Program	1982 Procurement	Total Program	Program Stretchout	SAR	Claimed	Date Reassigned	Tenure (months)
A-10	141	-104	37	28	--	182	--	--	Nov 81	15
F-15	510	24,665	25,175	--	46	44	0	126	Jul 81	13
F-16	2,101	18,460	20,561	--	41	--	1,178	993	--	--
E-3A	103	1,659	1,762	--	--	16	73	213	--	--
E-4	31	-588	-557	--	--	--	588	570	--	--
EF-111A	42	--	42	--	--	--	--	--	May 81	15
B-1B	--	--	29,538b/	--	--	--	--	--	--	--
IR Maverick	666	--	666	--	16	8	--	--	--	--
DSCS III	549	--	549	--	47	41	--	--	--	--
NAVSTAR GPS	320	--	320	--	14.6	82	277	249	--	--
ALCM	652	1,400	2,052	--	34c/	84	--	--	Sep 81	16
GLCM	121	--	121	--	--	--	--	--	--	--
HARM	491	--	491	--	14	--	--	--	--	--
Sparrow (AIM-7M)	317	-195	122	67	25	35	--	--	--	--
Sidewinder (AIM-9M)	0.4	--	0.4	--	--	--	9	74	--	--

a/ Data taken from the four SARs submitted in 1981.

b/ The December SAR was the first report since the program was restored.

c/ Not reported. ALCM-C costs that create the threshold breach are included in the Congressional Data Sheet but not in the SAR.

(Continued)

TABLE A-3. (Continued)

Program	Schedule		Costs Excluded from SAR	Indications of Future Growth	Inflation Overstated or Understated (-)		
	Number of Milestones Slipped	Delivery Slips			Offsets from Inflation Indexes	Assumptions	
						Administration	CBO
A-10	--	--	--	--	--	--	--
F-15	--	X	--	X	--	--	-1,964
F-16	--	--	--	X	-31	794	-2,512
E-3A	--	--	--	--	-17	--	-111
E-4	--	--	511	--	--	--	--
EF-111A	1	X	--	--	-17	--	--
B-1B	--	--	700	X	--	--	-1,052
IR Maverick	4	X	--	X	--	--	--
DSCS III	--	--	--	X	--	--	--
NAVSTAR GPS	5	X	929	X	--	--	--
ALCM	--	--	1,883	X	--	--	--
GLCM	3	--	--	X	--	--	--
HARM	--	--	--	--	--	--	--
Sparrow (AIM-7M)	--	--	--	X	--	--	--
Sidewinder (AIM-9M)	--	--	--	--	--	--	--

APPENDIX B. INDICATIONS OF FUTURE COST GROWTH

This appendix presents notes on the SAR weapons systems indicating program changes or technical difficulties that may lead to future cost growth. The material is drawn from the December 1981 SAR. Where possible, the dollar impact of the changes is shown. The notes cover such items as late delivery of weapons, unexplained growth in contract estimates, and potential performance problems. The systems are presented by service.

ARMY PROGRAMS

PATRIOT

The system is experiencing technical shortfalls, and measures have been initiated to correct problems before deployment.

The number of missiles required per firing unit has increased 167 percent--from 12 in 1965 to 20 in 1972 to 32 at present.

The cost of completing the program beyond 1987 may be understated by as much as $1 billion. Total costs beyond 1987 are given as $1.1 billion for 2,052 missiles, or $0.5 million each, while in 1987 the total costs are $1.2 billion for only 920 missiles or $1.3 million each. It is unlikely that a contractor could achieve a 59 percent unit cost reduction at the tail end of a program.

PERSHING II

The contractor is behind the development delivery schedule for two propulsion sections and five reentry vehicles because of technical and manufacturing start-up problems.

Preliminary analysis of contractor proposals has resulted in the new program office estimate included in the 1983 budget and the SAR. The SAR indicates, however, that the estimate will be updated in the future after a baseline cost estimate, a should-cost analysis, and completion of negotiations. Therefore additional cost growth may be expected in the future.

The number of missiles to be tested has been reduced from 28 to 18, but the cost reduction associated with this will be given in a future SAR.

AH-64

The production decision, contract award, and first production delivery milestones have slipped two to three months because of program restructuring.

The SAR total cost estimate excludes $122 million for construction and development, although this is included in the February 1982 Congressional Data Sheets.

Although 90 helicopters have been cut from the program, the current changes section of the SAR does not indicate any reduction in support costs for these aircraft.

Even after reducing the amount of work and redefining the effort, the government's estimated price for one development contract has increased $8.5 million, or 10 percent.

SOTAS

The 1982 Authorization Defense Act terminated this program because of cost and schedule growth. This is the last SOTAS SAR.

The SAR total estimate excludes $9.5 million in termination costs.

FIGHTING VEHICLE

Three contracts for production analysis by a potential second source have been awarded, but the current estimate contains no funding for second-source production.

The contractor is behind the procurement delivery schedule by one vehicle and sixteen 25mm weapons. The SAR states that failure to improve gun deliveries by the next SAR will set back the vehicle delivery schedule. In addition, improper propellant performance has caused a slip in the ammunition delivery schedule. It is possible that these delays will affect future costs.

M-1 TANK

The completion of development testing has slipped three months, and the contractor is 40 tanks behind the December 1980 procurement delivery schedule.

The SAR excludes $43.5 million in construction costs that are included in the Congressional Data Sheets.

ROLAND

Since September 1981, total program costs have decreased about $2 billion, or 59 percent, because procurement beyond 1981 has been terminated. The SAR states that there is sufficient funding to complete delivery of the 27 fire units and 595 missiles currently on contract. The hardware will be used for a single battalion at a total program cost of $1.4 billion.

During this quarter, four production missiles with an improved fuze were fired. One of the missile firings was unsuccessful.

Because of technical problems, a reliability improvement program was established to ensure that the system would meet all operational and technical requirements. Because the program was restructured, the reliability improvement program has been curtailed. In CBO's view, this curtailment could result in reduced system capability and/or increased costs in order to correct system deficiencies. The SAR states that the impact of this curtailment is currently being assessed.

COPPERHEAD

The preliminary SAR stated that advanced procurement of long-lead materials had been delayed because OSD temporarily withheld 1982 funds. This SAR also stated that the withholding of funds will increase cost by an amount yet to be determined. These comments were stricken from the final version of the SAR.

Problems in fabricating components and subassemblies have caused a one-month delay in completion of Initial Production Testing (IPT).

From October to December 1981, 18 projectiles were fired. Preliminary analysis indicates that five failures (28 percent) appear to have been

caused by manufacturing problems. As of January 18, 1982, only 17 of 25 projectiles fired were reliable.

The contractor's cost performance reports, received in January 1982, indicated a potential significant cost growth because of start-up problems. The results of the evaluation of these reports will be reported in the March SAR. In addition, the government's estimate for one contract was increased by $29 million, or 31 percent, for no apparent reason other than cost growth.

The SAR states that, because of the lower inflation rates applied to ammunition, the current estimated cost will not support the procurement profile.

MLRS

The government's estimate for one development contract was increased $7 million, or 6 percent, because of hardware design problems, software problems, and cost growth. The SAR states that this does not include the impact of late delivery of government-furnished carrier vehicles resulting from a contractor strike.

NAVY PROGRAMS

AV-8B

Three of the four R&D aircraft that were to be delivered before September 31, 1981, have still not been delivered.

LAMPS MK III

Following a program review in September 1981, DSARC III has slipped again, this time to June 1982 instead of April 1982.

CAPTOR

For October through December 1981, the contractor fell short of scheduled deliveries by two capsules. This leaves the overall total of capsules actually delivered 132 short of planned deliveries.

As in previous SAR reports, MK 46 torpedo costs are excluded from the Captor program even though the Captor system has no capability without a torpedo. CBO estimates that this would add roughly $840 million, or 50 percent, to the total program. The program office states the torpedos would be procured even without Captor. This implies that some torpedos are fulfilling two concurrent requirements.

HARM

Evaluation and testing (OPEVAL/IOT & E) was delayed because of wing flutter problems. Software corrections have been undertaken to correct the problem since publication of the December SAR. Testing was restarted February 21, 1982.

SPARROW (AIM-7M)

The AIM-7M program is five missiles behind its initial production schedule, because of early production problems. There is no indication when this will be corrected or at what cost.

TOMAHAWK

Delivery of the first three production land-attack units is behind schedule. Three related milestones have slipped from two to five months each. No costs have been attributed to this production delay.

SAL 5-INCH GUIDED PROJECTILE

The Secretary of the Navy cancelled this program in December 1981.

TRIDENT SUBMARINE

In responding to a GAO study, the Naval Sea Systems Command noted a possibility that future delivery schedules could change unless Electric Boat management takes (unspecified) strong measures.

Delivery of the last ship has been delayed 15 months. This delay, along with other delivery slips and a new shipbuilding schedule, will generate $703 million in additional costs.

TRIDENT I MISSILE

Production is 8 missiles behind schedule according to the December SAR. However, a comparison of planned deliveries for September to December (24) and actual deliveries as of September (205) indicates that production is 12 behind, with 217 delivered out of an expected 229.

NUCLEAR ATTACK SUBMARINE (SSN-688 CLASS)

At least one ship has not met its planned delivery date. Later delivery dates have been set for SSN-716-718, while earlier dates have been set for SSN-721-723. No clear cost adjustments have been made to reflect these changes.

SSN-688 and Trident production are closely related through their production at Electric Boat (EB). Problems or improvements in Trident construction can therefore affect SSN-688 production, often in an opposite way. Since the Trident SAR makes references to possible schedule changes if EB management does not take strong measures, SSN-688 production may also be affected in the near future.

CVN

No schedule change has been made to reflect a recent agreement with the contractor to speed up construction.

AIR FORCE

F-15

Although development costs increased $428.4 million, or 19 percent, from September to December, the SAR contains no provision for any development aircraft for the new derivative version.

The planned configuration for the new derivative version includes the existing F100 engine that has had problems in the past. The current changes do not mention a provision for an expanded engine service warranty that was included in the F-16 program for the same engine. It seems likely that the F100 engine may ultimately be replaced by a new derivative fighter engine, perhaps increasing program costs.

As of the date of this report, the final SAR for this system had not been submitted.

F-16

Although the F-16E configuration adds weight to the aircraft, the current estimate for the derivative fighter includes the existing F100 engine that has had problems in the past. An additional $64.5 million is included for an expanded engine warranty to improve maintainability and availability. The F100 engine may ultimately be replaced by a new derivative fighter engine, perhaps increasing costs. Aviation Week and Space Technology (February 1, 1982) reports that two of the derivative development aircraft will be fitted with the General Electric F101 derivative fighter engine and will be demonstrated this fall.

EF-111A

The contractor is one aircraft behind delivery schedule. The SAR states that initial production problems have moved the acceptance of the third aircraft into the first calendar quarter of 1982.

Completion of phase IB of the development contract has slipped three months because of additional delays in the development of automatic test equipment. The SAR section on current changes does not identify any dollar impact of these delays.

B-1B

This is the first SAR since the program was restored.

The SAR states that the current total program cost estimate of $20.5 billion in 1981 dollars excludes several directly related B-1B expenses. These costs in 1981 dollars are: $246.9 million for simulators, $81.2 million for facility improvements, $148.2 million for the component improvement program, $41.1 million for evaluation of the B-1A defensive avionics, and "to-be-determined" construction costs. If these costs were spread and adjusted for inflation using Administration economic assumptions, total program costs would increase by at least $700 million.

IR MAVERICK

From September to December, total program costs increased by $665.8 million, or 16 percent. The primary causes of this increase were revised inflation adjustments and other adjustments reflecting technical and cost problems in the research and development phase.

The contractor is 12 missiles behind the development delivery schedule. In addition, four of the schedule milestones have slipped one to two months. The current changes section of the SAR does not identify any dollar impact for these delays.

The December SAR states that the program will be restructured in the light of current missile performance, and that further information will not be available until the March SAR.

The New York Times (March 8, 1982) reported that poor test results had led the Air Force to delay major production of the new IR Maverick until early 1984, depending on the outcome of extended testings. The Washington Post (February 24, 1982) reported that the TV Maverick had been a failure in Vietnam. The article quoted General Vogt, who commanded U.S. forces in Vietnam, as saying, "To have to rely on it as an antitank weapon makes no sense."

DSCS III

From September to December, total program costs increased by $548.8 million, or 47 percent. The primary causes were revised estimates based on contractor proposals (69 percent), additional hardware and engineering costs (14 percent), revised inflation rates (9 percent), and schedule changes (7 percent).

As of the date of this report, the final SAR for this system had not been submitted.

NAVSTAR GPS

A one-year delay in the start of production has increased total costs by $82.4 million. In addition, five schedule milestones have slipped from four to nine months.

The contractor is one satellite behind the development delivery schedule.

The SAR states that user equipment costs totaling $929.3 million are not included in the current total estimate. The development contractors for user equipment have experienced unfavorable cost and schedule performance in the past. In addition, first production contract awards have been delayed six months because of a user equipment contractor schedule slip. Unfortunately, the contract information section of the SAR does not require the cost and schedule information that is provided to program management monthly and to DoD quarterly. This information would enable a better assessment of future trends. Information from a separate source indicates that in June 1981 one contract was 27 percent over cost ($7.4 million) and 24 percent behind schedule ($8.6 million), while the other contract was 19 percent over cost ($5 million) and 11 percent behind schedule ($3.3 million). If the contractors continue to overrun these development contracts, additional funding may be required for production of user equipment. An overrun of only 25 percent could increase production costs by at least $80 million.

ALCM

The Aerospace Daily (December 1, 1981) reported that a recent Brookings Institution study warns that the missions for the cruise missile have not been clearly defined and that the weapon is likely to become more expensive. In addition, the study states that the use of ALCM against "countervalue targets" such as cities and industries may not be needed, given the submarine-launched ballistic missile force.

GLCM

Three schedule milestones have slipped from two to three months because of delayed software delivery and additional required testing. The planned delivery of two development missiles has slipped three months, and delivery of one production launcher has slipped six months. The current changes section of the SAR does not identify any cost impact of these delays.

The government's estimated price at completion for the prime development contract has increased $14 million, or 10 percent, since the September SAR because of schedule slips, design and integration problems, and

late delivery of government-furnished equipment. The SAR also states that a further schedule impact is expected because of a delay in software development.

The government's estimate for the four contracts included in the SAR is a total of $19.2 million, 7 percent above the contractor's estimates. At least three of these contracts are experiencing unfavorable cost performance.

The Aerospace Daily (December 1, 1981) reported that a recent Brookings Institution study warns that the missions for the cruise missile have not been clearly defined and that the weapon is likely to become more expensive.

AIM-7M SPARROW III

Since the September SAR, total program costs have increased $121.8 million, or 8 percent. The primary causes for the increase were revised estimates based on actual contractor proposals, and revised inflation adjustments that were partially offset by a decrease of 1,662 missiles--a 14 percent reduction in missile quantities from the last SAR.

The SAR states that the current estimate is short $23 million in the procurement of 155 additional missiles to complete the buy of 1,205 missiles in 1981, and $72.4 million in the procurement of 535 additional missiles to complete the buy of 1,560 missiles in 1982.